Australian Bureau of Statistics

6525.0 - Experimental Estimates of Imputed Rent, Australia, 2003-04 and 2005-06
Previous ISSUE Released at 11:30 AM (CANBERRA TIME) 01/05/2008 First Issue

# Summary

## Main Features

### NOTES

#### ABOUT THIS PUBLICATION

This Information Paper presents household level estimates of the imputed rent for owner-occupied dwellings derived from the 2003-04 and 2005-06 Surveys of Income and Housing and the 2003-04 Household Expenditure Survey.

Although household sector imputed rent estimates for owner-occupiers have been included in the Australian System of National Accounts for many years, the ABS has not previously released estimates of imputed rent at the household level.

Estimating imputed rent at the household level supports a broader comparison of the economic wellbeing of owner-occupier households and their social and economic circumstances relative to other households. The inclusion of imputed rent in household income estimates is in accord with the international standards for household income statistics.

The estimates presented in this publication are experimental in nature. The ABS would welcome any comments from users on the methodology applied in the study and the usefulness of the resulting estimates for analytical purposes. Comments can be forwarded to: Director, Living Conditions Section, Australian Bureau of Statistics, Locked Bag 10, BELCONNEN ACT 2616. Alternatively, email <living.conditions@abs.gov.au>.

The unit record imputed rent estimates are available on the following confidentialised unit record files (CURFs):

- Survey of Income and Housing, Australia: CURFs, 2005-06 (2nd edition) (cat. no. 6541.0.30.001)
- Household Expenditure Survey and Survey of Income and Housing: CURFs, 2003-04 (3rd edition) (cat. no. 6540.0).

#### INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070.

## About this Release

This Information Paper presents experimental estimates of the imputed rent for owner-occupied dwellings among private households in Australia in 2003-04 and 2005-06. Estimates of the benefit to tenants paying subsidised rent and households occupying their dwelling rent free are also included.

The paper outlines the methodology and sources used in the study and analyses the effect of the imputation on the distribution of income. The publication encourages comments from users on the methodology applied in the study and the usefulness of the resulting estimates for their research and analytical purposes.

# Contents

## CONTENTS



# Introduction



### BACKGROUND

Household income statistics compiled from the household level are critical to the analysis and modelling that supports the understanding of the socio-economic circumstances of different household types. They are also important in developing and evaluating policies on income support, income distribution and income taxation.

The ABS regularly collects detailed information on household income, expenditure and wealth in its Survey of Income and Housing (SIH) and Household Expenditure Survey (HES). SIH is now conducted on a two yearly basis, with the latest published results relating to 2005-06. HES is now conducted on a six yearly basis, with the latest published results relating to 2003-04. SIH and HES were conducted on an integrated basis for 2003-04 and will be again for future HES cycles, the next being conducted in respect of 2009-10.

The ABS releases summary statistics on household income in Household Income and Income Distribution, Australia (cat. no. 6523.0), with more detailed tables released in cat. no. 6523.0.55.001. Confidentialised Unit Record Files (CURFs) from the surveys are also released, to support comprehensive and detailed analyses by users.

The most restricted concept of income used in income analysis is gross private individual income. While this measure is useful for certain purposes, it is generally of limited use when trying to understand the economic wellbeing of individuals. Published ABS household income analysis, in accordance with international statistical standards, extends the income measure in various ways to include income transfers in cash and in kind, deducts direct and indirect taxes, and looks at equivalised (household size adjusted) household incomes to take account of the economies of scale in shelter and the effects of income sharing on the economic wellbeing of individuals.

This paper further extends the analysis of income to include the rental incomes that can be imputed to flow to people living in homes owned by the occupants and to those people paying subsidised rents. Such imputations are recommended in international statistical standards to allow for more meaningful comparisons of the income circumstances of people living in different tenure circumstances, and to understand changes over time in income levels and income distribution when tenures may be changing over time.

### IMPUTED RENT

While household sector level estimates of imputed rent have been included in the Australian System of National

Accounts (ASNA) for many years, this information paper includes the experimental results of the first study undertaken by the ABS to produce imputed rent estimates at the household level.

The international standards for household income and expenditure statistics account for imputed rent for owner-occupied dwellings in the definitions of household income and expenditure. The standards also recommend that the estimates be separately provided to support different types of analyses.

Including imputed rent as part of household income and expenditure conceptually treats owner-occupiers as if they were renting their home from themselves, thus simultaneously incurring rental expenditure and earning rental income.

Imputed rent is included in income on a net basis i.e. the imputed value of the services received less the value of the housing costs incurred by the household in their role as a landlord. Gross imputed rent is added to expenditure, and any housing costs generally borne by a landlord are deducted.

Experimental estimates of the imputed rent for owner-occupied dwellings among private households in Australia are presented in this paper for 2003-04 and 2005-06. Estimates of the imputed benefit to tenants paying subsidised rent and for households occupying their dwelling rent-free are also presented, along with an analysis of the effect of the inclusion of imputed rent on the distribution of income among private households in Australia.

Previous Page Next Page

# International Standards

Contents >> International Standards

**CURRENT INTERNATIONAL STANDARDS**

The international standards for household income and expenditure statistics have, for several decades, included imputed rent for owner-occupied dwellings in the conceptual definitions of both household income and expenditure. The current international standards for household income and expenditure statistics were adopted by the 17th International Conference of Labour Statisticians (ICLS) in 2003.

The ICLS standards recommend that, when estimating consumption expenditure, the services of owner-occupied dwellings be valued as the gross rental equivalence. Costs that are normally paid by landlords such as property taxes, property and liability insurance, mortgage interest, water and sewerage charges and repairs and maintenance of the dwelling should be excluded from household consumption expenditure. For the estimation of household income, the ICLS standards recommend that imputed rent be included on a net basis, with the housing costs normally paid by landlords being deducted from the gross rental equivalence.

Where rents paid on rented dwellings are subsidised, the international standards recommend that a rental benefit flow be estimated at the market rental value for an equivalent dwelling less the rent actually paid.

The international standards for the macro-economic statistics (System of National Accounts, 1993) recommend the inclusion of imputed rent for owner-occupied dwellings in the household sector estimates on a comparable basis to the ICLS standards for household level estimates.

**REFERENCES**

International Conference of Labour Statisticians 2003, **Final Report of the 17th International Conference of Labour Statisticians, Geneva, 24 November to 3 December 2003**.

Previous Page Next Page

# Data and Methodology

Contents >> Data and Methodology

This section contains the following subsection :



Previous Page Next Page

# Overview



**OVERVIEW**

This section outlines the sources and methods used by the ABS to produce experimental household level estimates of the imputed rent for owner-occupied dwellings among private households in Australia in 2003-04 and 2005-06. In this study, the net imputed rent for owner-occupied dwellings has been estimated as:

- the market value of the rental equivalent (referred to as gross imputed rent); less
- the housing costs normally paid by landlords i.e. rates, mortgage interest, insurance, repairs and maintenance.

The market value of the rental equivalent for owner-occupied dwellings can be estimated in a number of ways (e.g. self report, stratification and regression approaches). The Statistical Office of the European Communities, Eurostat, recently reviewed rental equivalence methods and recommended regression or stratification techniques in countries where representative market rates could be obtained (Eurostat 2006). Australia has a well organised and established private rental market and therefore chose hedonic regression to estimate the market value of the rental equivalent of owner-occupied dwellings.

The imputation of gross and net imputed rent has been extended from owner-occupied dwellings to other housing tenures in order to value the in-kind benefit conferred to households paying subsidised rent (e.g. tenants of an employer or of a state/territory housing authority) and households occupying their dwelling rent-free. In general terms, the gross imputed rent for these housing tenures has been estimated as for owner-occupiers. In deriving net imputed rent, actual rent paid is the major housing cost deducted.

Previous Page Next Page

# Data sources



**DATA SOURCES**

The major data sources used in this study are the 2003-04 and 2005-06 ABS Surveys of Income and Housing (SIH), the 2003-04 ABS Household Expenditure Survey (HES) and the 2001 and 2006 Censuses of Population and Housing.

**SIH 2003-04 and 2005-06**

SIH 2003-04 and 2005-06 collected detailed information about the income, assets, liabilities and household characteristics of households in private dwellings throughout Australia. The sample consisted of 11,361 households in 2003-04 and 9,961 households in 2005-06, which were enumerated over the course of the respective financial years.

In this study, information reported in the SIH on dwelling and household characteristics and the rent paid by private market renters is used as the basis for estimating the gross imputed rent for owner-occupied and other dwellings. Information on housing costs reported in the SIH are also used in the estimation of net imputed rent.

**HES 2003-04**

The 2003-04 HES sample of 6,957 households was a subset of the 2003-04 SIH sample of 11,361 households. Households selected to participate in the HES were required to complete both the SIH and HES questionnaires. In the HES a personal diary was used, in which usual residents aged 15 years and over recorded their expenditure over two weeks.

Information reported for 2003-04 in the HES is used to estimate average household expenditure on repairs and maintenance and house insurance costs for owner-occupiers in deriving net imputed rent estimates for both 2003-04 and 2005-06.

**Census of Population and Housing 2001 and 2006**

The Census of Population and Housing counts the number of people in Australia on Census night as well as collecting information on their key characteristics, including information about the dwellings in which they live.

Summary information on median rent by postcode from the 2001 and 2006 Censuses, and deciles based on the Index of Relative Socio-economic Advantage/Disadvantage from the 2001 Census, are used in the estimation of gross imputed rent. These items provide supplementary information about the area in which each of the dwellings in the SIH is located.

For further information about these data sources see:

- **Household Expenditure Survey and Survey of Income and Housing User Guide, Australia, 2003-04 (cat. no. 6503.0),**
- **Survey of Income and Housing User Guide, Australia, 2005-06 (cat. no. 6553.0), and**
- **National Statistics, Census Data, Census Reference and Information.**

All are available on the ABS website <https://www.abs.gov.au>.

Previous Page Next Page

# Estimating imputed rent

Contents >> Data and Methodology >> Estimating imputed rent

**ESTIMATING IMPUTED RENT**

This study uses hedonic regression to estimate the market value of the rental equivalent of an owner-occupied dwelling. Data from the SIH on reported rents paid by private market renters is regressed on the characteristics of their rented dwellings e.g. location and dwelling structure. The estimated coefficients are then applied to the corresponding characteristics of owner-occupied and other dwellings to produce imputed values of the rental equivalence for these dwellings.

Net imputed rent is estimated as gross imputed rent less reported housing costs. For owner-occupiers, the housing costs subtracted are those which would normally be paid by landlords i.e. rates, mortgage interest, insurance, repairs and maintenance. For other housing tenures for which net imputed rent is being estimated, the housing costs that are subtracted are largely made up of the reported rent paid, but other housing costs incurred, such as rates, are also subtracted for some tenure types. In the case of tenants of state/territory housing authorities, the net imputed rent estimates have been benchmarked to administrative data published in the national data reports produced under the Commonwealth-State Housing Agreement (CSHA).

Appendix 1 describes in more detail the methods used to construct experimental estimates of imputed rent at the household level. The four main steps involved in the imputation are summarised below.

**Step 1. Build a model for gross imputed rent based on renters**

A hedonic regression model was applied to quantify the relationship between certain reported characteristics of the dwelling and the reported rent paid by private market renters using data from the SIH. Private market renters were defined as those tenants who rent an unfurnished dwelling privately or through a real estate agent. The rent paid by renters with landlord types that might potentially subsidise rents were excluded from the model. This included tenants of: state/territory housing authorities; employers; church/community groups; and parents (or other relatives).

The log of weekly rent paid for private unfurnished dwellings (gross, before any deductions for refunds or subsidies received from outside the household) was regressed against location and dwelling characteristics considered important in determining the market rent paid (see Appendix 1 for a list of variables used in the model).

**Step 2. Estimate gross imputed rent for owner-occupiers**

After estimating the rent model for private market renters, experimental estimates of the gross imputed rent for owner-occupied and other dwellings were predicted by applying the estimated coefficients from Step 1 to the characteristics of these dwellings. An adjustment was made for high value dwellings as the available characteristics could not fully explain variations in rent for these dwellings.

**Step 3. Estimate net imputed rent for owner-occupiers**

To calculate the net imputed rent for owner-occupied dwellings, the following housing costs normally paid by landlords were subtracted from gross imputed rent: body corporate payments; general and water rates; the interest component of repayments of loans that were obtained for the purposes of purchasing or building; house insurance; and repair and maintenance costs. All housing costs were net of refunds or subsidies received from outside the household.

The SIH contains information on all the relevant housing cost items except house insurance and repairs and maintenance. Expenditure information on house insurance and repairs and maintenance is only available for the HES subsample in 2003-04. The HES data were used to estimate expenditures on these items for the entire SIH sample in 2003-04, and to enable imputation in 2005-06 when this information was not collected. See Appendix 1 for details of the methods used for the estimation of these items.

**Step 4. Estimate net imputed rent for other housing tenures**

For other housing tenures, the housing costs subtracted from gross imputed rent to derive net imputed rent are outlined in table 3.1.

**3.1 Housing costs subtracted from gross imputed rent, other tenure types**

| Housing tenure | Housing costs (net of refunds) |
|---|---|
| Subsidised renter(a) | Reported rent paid. |
| Occupied rent-free | Body corporate fees; and general and water rates payments. |
| Rent-buy/shared equity scheme | Reported rent paid; body corporate fees; general and water rates payments; the interest component of repayments of loans that were obtained for the purposes of purchasing or building the dwelling; house insurance; and repair and maintenance costs. |
| Life tenure scheme | Body corporate fees; and general and water rates payments. |

(a) Includes households renting from: a state/territory housing authority; a parent or other relative not living in the same household; an employer; a housing cooperative or community/church group.

For each of the housing tenures described in table 3.1, any refunds or subsidies received for rent payments were implicitly accounted for in the estimation of net imputed rent. For consistency across all housing tenures, the reported values of any rental refunds or subsidies received by private market renters have been included in the experimental estimates of net imputed rent.

For tenants of state/territory housing authorities, the mean difference between the initial gross imputed rent estimates and the reported rent paid were compared by state with the mean weekly rental subsidy published in the public rental housing CSHA National Data Reports (AIHW 2005 and 2006). It was found that the initial net imputed

rent estimates from this study overstated the mean benefit in all states. This outcome was probably due to overstatement in gross imputed rent estimates due to differences in the private and public rental markets that could not be captured by the imputation model.

Therefore, the net imputed rent for public tenants was benchmarked to the CSHA published state mean weekly rental subsidies using a multiplicative adjustment (described in Appendix 1).

Previous Page Next Page

# Limitations

Contents >> Data and Methodology >> Limitations

**LIMITATIONS**

The effectiveness of the approach taken in this study is dependent on the availability of data on price determining property characteristics in the private rental market. Data are not available in SIH at the individual dwelling level to better define location in terms of attributes such as views or beach frontage and proximity to employment, transport, and shops/services. Data are also not available on the value of rented dwellings nor for some important physical characteristics of the dwellings such as outer-wall construction, availability of garaged or off-street parking, size of block or number of bathrooms.

It is also not possible to account for any quality differences that might exist between owner-occupied and rented dwellings with other similar characteristics. For example, owned dwellings may generally have higher quality fittings or building materials, or be maintained to a higher standard.

Previous Page Next Page

# References

Contents >> Data and Methodology >> References

**REFERENCES**

Eurostat 2006, 'HBS and EU-SILC Imputed Rent', Meeting of the Working Group on Living Conditions, Luxembourg, 15-16 May 2006.

Previous Page Next Page

# Experimental estimates of imputed rent

Contents >> Experimental estimates of imputed rent

**ESTIMATES OF IMPUTED RENT**

Table 4.1 presents the experimental estimates of gross and net imputed rent for owner-occupied dwellings and other housing tenures where a rent imputation has been made. The effect of adding net imputed rent to disposable household income is also shown (on an equivalised basis).

**4.1 Experimental estimates of gross and net imputed rent, by housing tenure, 2003-04 and 2005-06(a)**

| | Experimental estimates | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean equivalised disposable household income (per week) | Mean reported rent paid (per week) | Mean gross imputed rent (per week) | Mean net imputed rent (per week) | Adjusted mean equivalised disposable household income, incl. imputed rent (per week) | Number of households | Average number of persons in household | Number of households in sample |
| | $ | $ | $ | $ | $ | '000 | no. | no. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **2003-04** | | | | | | | | |
| Owner without a mortgage | 518 | - | 209 | 150 | 610 | 2 702.9 | 2.2 | 3 925 |
| Owner with a mortgage | 618 | - | 213 | 19 | 627 | 2 713.8 | 3.1 | 4 085 |
| Renter | | | | | | | | |
| From state/ territory housing authorities | 290 | 84 | 150 | 67 | 332 | 376.4 | 2.1 | 608 |
| Other subsidised renter(b) | 516 | 124 | 174 | 54 | 548 | 216.8 | 2.4 | 329 |
| Market renter(c) | 529 | 196 | - | 7 | 533 | 1 540.3 | 2.4 | 2 135 |
| Occupied rent-free | 507 | - | 176 | 160 | 606 | 152.2 | 2.2 | 225 |
| Rent-buy/life tenure scheme | 468 | **19 | 181 | *83 | 513 | 33.5 | 2.3 | 54 |
| All households | 553 | 47 | 164 | 69 | 590 | 7 735.8 | 2.5 | 11 361 |
| **2005-06** | | | | | | | | |
| Owner without a mortgage | 625 | - | 236 | 172 | 731 | 2 718.1 | 2.2 | 3 452 |
| Owner with a mortgage | 716 | - | 245 | 5 | 718 | 2 772.0 | 3.1 | 3 512 |
| Renter | | | | | | | | |
| From state/ territory housing authorities(b) | 356 | 100 | 183 | 83 | 404 | 368.8 | 2.3 | 525 |
| Other subsidised renter(c) | 514 | 150 | 206 | 63 | 552 | 206.0 | 2.3 | 286 |
| Market renter | 603 | 219 | - | 7 | 608 | 1 686.1 | 2.3 | 1 966 |
| Occupied rent-free | 545 | - | 207 | 195 | 668 | 144.2 | 2.1 | 176 |
| Rent-buy/life tenure scheme | 407 | *41 | 186 | 93 | 464 | 30.9 | 1.8 | 44 |
| All households | 644 | 56 | 185 | 72 | 682 | 7 926.2 | 2.5 | 9 961 |

* estimate has a relative standard error of 25% to 50% and should be used with caution
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use
- nil or rounded to zero (including null cells)
(a) The mean incomes are calculated with respect to the relevant number of persons (i.e. they are person weighted), while the mean rents are calculated with respect to the number of households (household weighted). For more information on person and household weighted measures see Appendix 1 of Household Income and Income Distribution, Australia (cat. no. 6523.0).
(b) Includes households renting from: a parent or other relative not living in the same household; an employer; a housing cooperative or community/church group.
(c) Includes households renting from: a real estate agent; an unrelated person not living in the same household; or an owner/manager of a caravan park.

The estimated mean gross imputed rent for owner-occupiers was higher than the mean imputation for subsidised renters or other tenure types. For both reference periods, owners with a mortgage were imputed a slightly higher gross imputed rent than owners without a mortgage. This is consistent with a slightly higher median value of dwellings for owners with a mortgage.

Appendix 2 includes a comparison of the experimental estimates of the gross imputed rent for owner-occupier households produced at the household level in this study with the sector level estimates published in the Australian System of National Accounts (ASNA).

When housing costs are subtracted from the experimental estimates of gross imputed rent to derive net imputed rent, then, as expected, households who occupied their dwelling rent-free (2% of all private households) had the highest mean net imputed rent. Owners without a mortgage, who account for just over one third of all households, had the next highest mean net imputed rent.

Conversely, owners with a mortgage had the smallest net imputed rent, on average, at only $19 per week in 2003-04 and $5 per week in 2005-06. This reflects positive net rents for about half of the mortgagor households, largely offset by the negative net imputed rents estimated for those households in this group whose housing costs exceeded their estimated gross imputed rent (40% of the mortgagor households in 2003-04 and 45% in 2005-06 had negative net imputed rents).

Table 4.1 also shows the effect of adding net imputed rent to disposable household income. In 2003-04, the addition of net imputed rent to disposable household income contributed an additional 7% to income across all households. The effect in 2005-06 was similar at 6%.

However for some housing tenures the addition of net imputed rent to disposable household income saw a significant increase in their mean equivalised disposable household incomes. The largest effect was seen for households who occupied their dwelling rent-free (20% increase in 2003-04 and 23% increase in 2005-06). The addition of net imputed rent to income also saw significant income increases for owners without a mortgage (18% increase in 2003-04 and 17% in 2005-06) and tenants of state/territory housing authorities (15% increase in 2003-04 and 13% in 2005-06).

The overall effect of the addition of net imputed rent to disposable income is a reduction in the mean income disparities between housing tenures, with a significant decline in the ratio between tenures with the highest and lowest incomes. For example, in 2003-04, the ratio of the mean income of owners with a mortgage to the mean income of tenants of state/territory housing authorities declined from 2.1 to 1.9 when net imputed rent was included.

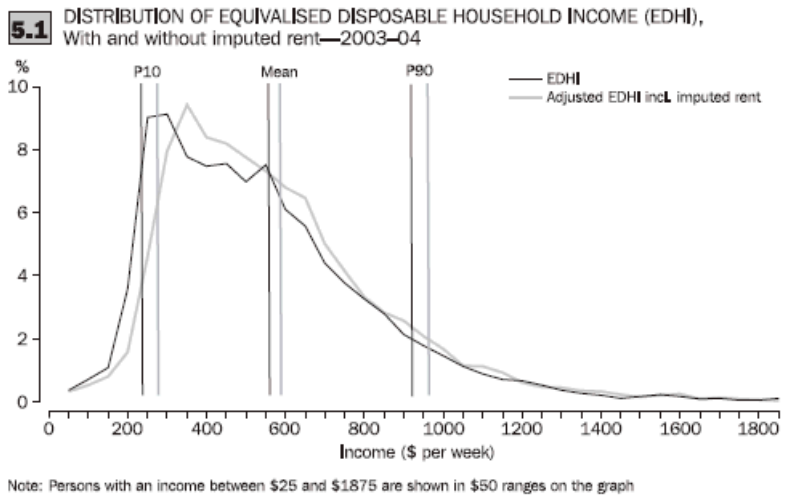
Previous Page Next Page

# Impact on Income Distribution

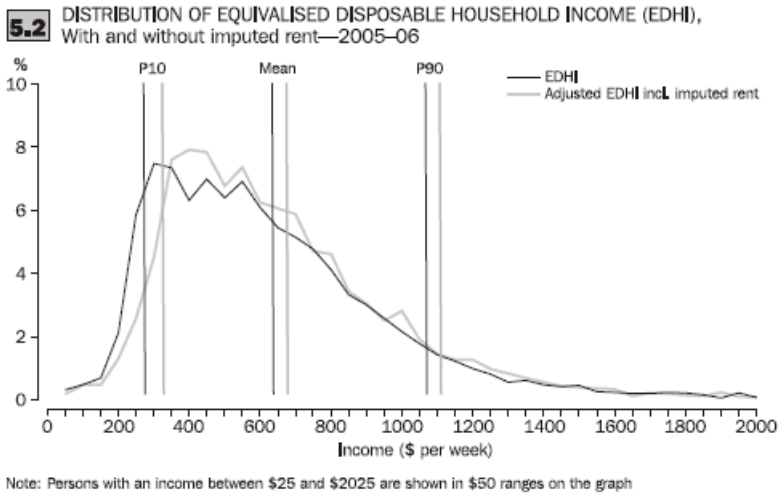
Contents >> Impact on Income Distribution

**IMPACT ON INCOME DISTRIBUTION**

The addition of net imputed rent to disposable household income has a partial equalising effect on the distribution of household income. This result reflects that, for many home owners in lower income ranges the family home that they own is the largest asset held by the household, and the net imputed rent income from that asset is a relatively large proportion of the households' incomes. In higher income ranges the net imputed rent income is a relatively smaller proportion of the households' incomes. This equalising effect of accounting for net imputed rent in income analysis is illustrated in the following frequency distribution graphs, tables and discussion of a range of distribution measures.




Note: Persons with an income between $25 and $1875 are shown in $50 ranges on the graph




Percentile ratios are one measure of the spread of incomes across the population. P90 (i.e. the income level separating the bottom 90% of the population from the top 10%) and P10 (i.e. dividing the bottom 10% of the population from the rest) are shown on the above graphs. In 2005-06, P90 for equivalised disposable household income was $1,073 per week and P10 was $274 per week, giving a P90/P10 ratio of 3.92. When net imputed rent was added to income the P90/P10 ratio fell to 3.43.

Table 5.3 includes a range of measures of the distribution of household income. These measures are discussed in Appendix 1 of Household and Income Distribution, Australia, 2005-06 (cat. no. 6523.0).

**5.3 Equivalised disposable household income distribution, 2003-04 and 2005-06**

| Indicator | | 2003-04 | | 2005-06 | |
|---|---|---|---|---|---|
| | | Equivalised disposable household income | Adjusted equivalised disposable household income, incl. imputed rent | Equivalised disposable household income | Adjusted equivalised disposable household income, incl. imputed rent |
| Mean income per week | | | | | |
| Lowest quintile | $ | 226 | 267 | 255 | 298 |
| Second quintile | $ | 360 | 401 | 414 | 454 |
| Third quintile | $ | 493 | 525 | 565 | 597 |
| Fourth quintile | $ | 645 | 675 | 746 | 774 |
| Highest quintile | $ | 1 041 | 1 082 | 1 239 | 1 287 |
| All persons | $ | 553 | 590 | 644 | 682 |
| Second and third deciles | $ | 300 | 344 | 341 | 389 |
| Median income per week | $ | 494 | 525 | 563 | 594 |
| Income per week at top of selected percentiles | | | | | |
| 10th (P10) | $ | 246 | 286 | 274 | 324 |
| 20th (P20) | $ | 299 | 345 | 340 | 387 |
| 30th (P30) | $ | 358 | 401 | 414 | 454 |
| 40th (P40) | $ | 425 | 460 | 489 | 523 |
| 50th (P50) | $ | 494 | 525 | 563 | 594 |
| 60th (P60) | $ | 562 | 594 | 647 | 676 |
| 70th (P70) | $ | 641 | 669 | 743 | 770 |
| 80th (P80) | $ | 747 | 778 | 867 | 897 |
| 90th (P90) | $ | 922 | 958 | 1 073 | 1 111 |
| Income share | | | | | |
| Lowest quintile | % | 8.2 | 9.0 | 7.9 | 8.7 |
| Second quintile | % | 13.0 | 13.6 | 12.9 | 13.3 |
| Third quintile | % | 17.8 | 17.8 | 17.6 | 17.5 |
| Fourth quintile | % | 23.3 | 22.9 | 23.2 | 22.7 |
| Highest quintile | % | 37.6 | 36.7 | 38.5 | 37.7 |
| All persons | % | 100.0 | 100.0 | 100.0 | 100.0 |
| Second and third deciles | % | 10.8 | 11.7 | 10.6 | 11.4 |
| Ratio of income at top of selected income percentiles | | | | | |
| P90/P10 | ratio | 3.75 | 3.35 | 3.92 | 3.43 |
| P80/P20 | ratio | 2.50 | 2.25 | 2.55 | 2.32 |
| P80/P50 | ratio | 1.51 | 1.48 | 1.54 | 1.51 |
| P20/P50 | ratio | 0.61 | 0.66 | 0.60 | 0.65 |
| Gini coefficient | no. | 0.297 | 0.277 | 0.307 | 0.290 |

| | | | | | |
|---|---|---|---|---|---|
| Number of households in sample | no. | 11 361 | 11 361 | 9 961 | 9 961 |

The Gini coefficient is a measure of the degree of income inequality across the population. The Gini coefficient is a single statistic that lies between 0 and 1, with values closer to 0 representing a lesser degree of inequality, and values closer to 1 representing greater inequality.

The addition of net imputed rent saw a decrease in the Gini coefficient in both years, again indicating that the inclusion of net imputed rent in income results in a more equal distribution. For 2005-06, the Gini coefficient was 0.307 without net imputed rent, declining by 5.5% to 0.290 when net imputed rent was included in income. In 2003-04, the decrease in the Gini coefficient was 6.7%.

The importance of net imputed rent at the lower end of the income distribution can be seen when looking at changes in the income shares going to groups of people at different points in the distribution. In both years, when net imputed rent is added to income, the share of income for those in the lowest two quintiles increases as does the income share for those in the 'low income' group (i.e. the 20% of the population in the 2nd and 3rd income deciles). In comparison, the share of income in the top two income quintiles decreases, while the income share of those in the middle income quintile remains steady.

Table 5.4 indicates the extent to which the income ranking of individuals changes as a result of adding net imputed rent. Quintiles based on equivalised disposable household income (EDHI) are compared against quintiles based on adjusted equivalised disposable household income including imputed rent.

**5.4 Comparison of income quintiles, with and without imputed rent, 2003-04 and 2005-06**

| ADJUSTED EDHI, INCL. IMPUTED RENT - QUINTILE | | Equivalised disposable household income - quintile | | | | | |
|---|---|---|---|---|---|---|---|
| | | Lowest | Second | Third | Fourth | Highest | All persons |
| **2003-04** | | | | | | | |
| Lowest | % | 16.0 | 3.9 | *0.1 | - | - | 20.0 |
| Second | % | 3.8 | 12.8 | 3.3 | *0.1 | - | 20.0 |
| Third | % | 0.2 | 3.1 | 13.6 | 3.0 | **0.1 | 20.0 |
| Fourth | % | - | 0.1 | 3.0 | 15.0 | 1.8 | 20.0 |
| Highest | % | - | - | - | 1.8 | 18.1 | 20.0 |
| All persons | % | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 100.0 |
| **2005-06** | | | | | | | |
| Lowest | % | 15.6 | 4.2 | *0.1 | - | - | 20.0 |
| Second | % | 4.2 | 12.3 | 3.5 | - | - | 20.0 |
| Third | % | 0.2 | 3.3 | 13.5 | 3.0 | - | 20.0 |
| Fourth | % | - | *0.1 | 2.8 | 15.0 | 1.9 | 20.0 |
| Highest | % | - | - | **0.1 | 1.9 | 18.0 | 20.0 |
| All persons | % | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 100.0 |

* estimate has a relative standard error of 25% to 50% and should be used with caution
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use
- nil or rounded to zero (including null cells)

In total, about one quarter of people (24% of persons in 2003-04 and 26% in 2005-06) move between income quintiles when imputed rent is added to income. The biggest movement is seen in the second and third income quintiles. For example, in 2005-06, 3.4% of people moved from the second quintile to a higher quintile when net imputed rent was added to income and all persons re-ranked, and 4.2% moved from the second quintile to the lowest quintile. The smallest movement was seen in the highest income quintile, where only 2% of persons in both 2003-04 and 2005-06 moved to a lower income quintile.

**LOW INCOME HOUSEHOLDS**

The ABS practice of using the second and third income decile as one measure when describing the characteristics of low income households is based on analyses of their net wealth and expenditure levels that indicate that many of the households included in the lowest income decile are unlikely to be suffering extremely low levels of economic wellbeing.

In 2005-06, of the people in the lowest equivalised disposable household income decile, 22% move to the second decile, 8% move to the third decile, 2% to the fourth decile and 1% to the fifth decile after adjusting for imputed rent

and re-ranking.

This large movement of people re-ranked out of the lowest income decile results in a significant change in the characteristics of households in the re-ranked lowest income decile. For example:

- the mean age of the household reference person drops from 58 to 49 years;
- mean net worth falls from $353,000 to $245,000;
- the proportion of households that own their home without a mortgage drops from 46% to 20%; and
- the proportion of renters increases from 37% to 54%.

The movements in 2003-04 are similar, and analysis of 2003-04 HES data shows that expenditure in the lowest decile falls significantly after re-ranking based on income adjusted to include imputed rent.

Previous Page Next Page

# Differences between Households

Contents >> Differences between Households

This section contains the following subsection :



Previous Page Next Page

# Differences between households

Contents >> Differences between Households >> Differences between households

**DIFFERENCES BETWEEN HOUSEHOLDS**

The effect of adding net imputed rent to income varies for households with different characteristics e.g. housing tenure, net worth, life cycle stage or geographic location. This section briefly outlines some of these differences using 2005-06 data. The general patterns are the same if 2003-04 data are used.

Previous Page Next Page

# Housing tenure

Contents >> Differences between Households >> Housing tenure

**HOUSING TENURE**

Adding net imputed rent to income has a significant effect on the ranking of people when examined in relation to their housing tenure. Table 6.1 shows the proportion of households, by tenure type, in each of the person weighted income quintiles, both before and after net imputed rent is added to their incomes.

**6.1 Housing tenure, by income quintiles, with and without imputed rent, 2005-06**

| | Owner without a mortgage % | Owner with a mortgage % | Renter from state/territory housing authority % | Other subsidised renter(a) % | Market renter(b) % | Occupied rent free % | All households(c) % |
|---|---|---|---|---|---|---|---|
| **Equivalised disposable household income - quintile** | | | | | | | |
| Lowest | 47.6 | 13.8 | 13.2 | 4.0 | 18.1 | 2.5 | 100.0 |
| Second | 39.9 | 27.6 | 4.5 | 2.7 | 22.8 | 2.1 | 100.0 |
| Third | 28.6 | 41.9 | 1.5 | 2.3 | 23.8 | *1.5 | 100.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fourth | 24.6 | 47.3 | *1.0 | 2.0 | 23.5 | 1.4 | 100.0 |
| Highest | 26.7 | 50.3 | *0.4 | 1.6 | 19.6 | 1.3 | 100.0 |
| All households | 34.3 | 35.0 | 4.7 | 2.6 | 21.3 | 1.8 | 100.0 |
| Second and third deciles | 45.9 | 19.6 | 7.6 | 2.9 | 21.2 | 2.1 | 100.0 |
| **Adjusted equivalised disposable household income, incl. imputed rent** | | | | | | | |
| Lowest | 30.1 | 21.7 | 13.9 | 4.5 | 27.7 | 1.3 | 100.0 |
| Second | 44.8 | 25.9 | 5.5 | 2.9 | 18.4 | 2.1 | 100.0 |
| Third | 34.6 | 38.5 | 1.6 | 1.6 | 21.5 | 1.8 | 100.0 |
| Fourth | 29.6 | 44.3 | *1.0 | 2.2 | 20.6 | 1.9 | 100.0 |
| Highest | 32.3 | 45.7 | *0.4 | 1.6 | 18.0 | 2.0 | 100.0 |
| All households | 34.3 | 35.0 | 4.7 | 2.6 | 21.3 | 1.8 | 100.0 |
| Second and third deciles | 43.7 | 21.7 | 11.3 | 3.5 | 17.6 | 1.7 | 100.0 |

* estimate has a relative standard error of 25% to 50% and should be used with caution
(a) Includes households renting from: a parent or other relative not living in the same household; an employer; a housing cooperative or community/church group.
(b) Includes households renting from: a real estate agent; an unrelated person not living in the same household; or an owner/manager of a caravan park.
(c) Includes participants in rent-buy/shared equity schemes and life tenure schemes.

Households in the lowest equivalised disposable household income quintile have the highest incidence of full ownership of their home. In 2005-06, almost one half of households (48%) in the lowest income quintile were owners without a mortgage. However the effect of adding net imputed rent to income reduced this proportion to less than one third (30%). This change predominantly reflects retirees with low incomes who own their own homes moving up into the next highest income quintile.

The decrease in the proportion of households which owned their home without a mortgage in the lowest income quintile resulted in an increase in the proportion of all other housing tenures in the lowest income quintile, except for households who occupy their dwelling rent-free, for which imputed rent has increased their incomes in a similar manner to those which own a home outright. The most significant proportionate increase in tenure type in the lowest income quintile was seen for owners with a mortgage (from 14% up to 22%), for whom the costs of servicing their mortgage reduced their net imputed rent incomes.

Previous Page Next Page

# Household net worth

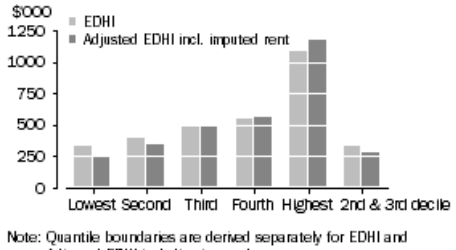
Contents >> Differences between Households >> Household net worth

**HOUSEHOLD NET WORTH**

The re-ranking of people that occurs when net imputed rent is added to income results in a change in their household net worth characteristics at different points along the income distribution.

Figure 6.2 shows that, in 2005-06, the mean net worth of households in the lowest and second income quintiles decreased by 27% and 10% respectively when net imputed rent was added to income, because some owners without a mortgage (and therefore with a large net worth) are re-ranked into a higher income quintile. The mean net worth of households in the third income quintile remained unchanged, while the mean net worth in the fourth and highest quintiles increased.

**6.2 MEAN NET WORTH, BY EQUIVALISED DISPOSABLE HOUSEHOLD INCOME (EDHI) QUINTILES, WITH AND WITHOUT IMPUTED RENT, 2005-06**




Note: Quantile boundaries are derived separately for EDHI and Adjusted EDHI including imputed rent

The distribution of net worth across income quintiles becomes more unequal when net imputed rent is added to income (see table 6.3). Before net imputed rent is included in income, the households in which the 20% of people with the lowest household incomes live account for 15% of total household net worth. This share declines to only 9% when net imputed rent is added to income. This decrease in the share of net worth for households in the lowest income quintile is consistent with the decrease in the incidence of households who had full ownership of their home following the addition of net imputed rent to income.

**6.3 Share of net worth, by income quintile, 2005-06**

| | Percentage share of total net worth | |
|---|---|---|
| | By quintile based on equivalised disposable household income | By quintile based on adjusted equivalised disposable household income, incl. imputed rent |
| | % | % |
| Lowest | 14.8 | 9.2 |
| Second | 12.8 | 12.8 |
| Third | 15.3 | 15.9 |
| Fourth | 18.1 | 19.6 |
| Highest | 39.1 | 42.5 |
| All households | 100.0 | 100.0 |
| Second and third deciles | 12.0 | 10.7 |

Previous Page Next Page

# Life cycle stages

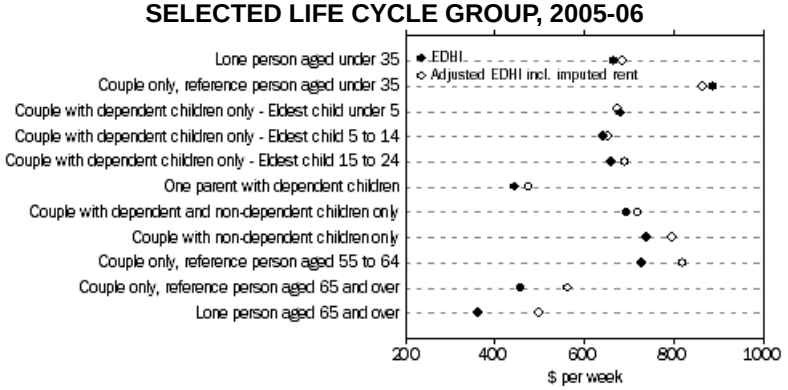
Contents >> Differences between Households >> Life cycle stages

**LIFE CYCLE STAGES**

A typical life cycle includes childhood, early adulthood, and the forming and maturing of families. As people progress through different life cycle stages and their family structures and financial situations change, so do their income and housing needs. The life cycle stages illustrated in Figure 6.4 provide a simplified view of life cycle possibilities and show both how incomes are distributed across the stages and how these incomes change when net imputed rent is included. Some household types, such as lone persons aged 35-65 years, are not included in this sequential analysis.

The tenure of a household is strongly related to life cycle stages, generally following a pattern of renting in early adulthood, moving to home purchase with a mortgage as partnerships are formed and children are born, and owning the home outright in older age. These relationships are reflected in the comparisons in the graph below of the mean equivalised disposable household incomes of selected life cycle groups with and without net imputed rent.

**6.4 Mean equivalised disposable household income (EDHI), WITH AND WITHOUT IMPUTED RENT, BY SELECTED LIFE CYCLE GROUP, 2005-06**




The inclusion of net imputed rent in income saw mean equivalised disposable household income increase in all life cycle groups except for young couples without children (with reference person aged under 35 years), and couples with dependent children only with an eldest child under 5. These two life cycle groups also had very low incidences of full home ownership.

Conversely, the largest increases in mean equivalised disposable household income, with the inclusion of net imputed rent in income, were seen in lone persons aged 65 years and over and couple only households with the reference person aged 65 years and over. These households also had the highest incidence of full home ownership at 86% and 74% respectively and the lowest incidence of mortgages on their own home (6% and 3% respectively).

The relative ranking of life cycle groups in the income distribution also changes with the addition of net imputed rent to income. Table 6.5 shows the proportion of households in each income quintile, by life cycle group, before and after the inclusion of net imputed rent.

**6.5 Life cycle groups, by income quintiles, with and without imputed rent, 2005-06**

| | | Lowest | Second | Third | Fourth | Highest | Total | Second and third deciles |
|---|---|---|---|---|---|---|---|---|
| **Equivalised disposable household income - quintiles** | | | | | | | | |
| Lone person under 35 | % | 18.8 | 10.7 | 25.3 | 23.8 | 21.5 | 100.0 | 10.1 |
| Couple only, reference person under 35 | % | *4.4 | 5.7 | 13.3 | 31.9 | 44.8 | 100.0 | 5.2 |
| Couple with dependent children only, eldest child under 5 | % | 6.5 | 22.0 | 24.7 | 27.2 | 19.5 | 100.0 | 11.6 |
| Couple with dependent children only, eldest child 5 to 14 | % | 13.5 | 22.8 | 25.6 | 20.7 | 17.3 | 100.0 | 18.7 |
| Couple with dependent children only, eldest child 15 to 24 | % | 15.7 | 14.6 | 25.5 | 24.0 | 20.1 | 100.0 | 12.3 |
| Lone parent with dependent and non-dependent children only | % | 39.4 | 29.0 | 17.4 | 8.7 | 5.5 | 100.0 | 36.6 |
| Couple with dependent and non-dependent children only | % | 7.8 | 18.0 | 19.1 | 32.7 | 22.4 | 100.0 | 15.4 |
| Couple with non-dependent children only | % | 9.5 | 15.9 | 18.6 | 25.8 | 30.1 | 100.0 | 9.1 |
| Couple only, reference person 55 to 64 | % | 20.4 | 16.7 | 17.8 | 18.3 | 26.8 | 100.0 | 18.9 |
| Couple only, reference person 65 and over | % | 46.7 | 29.7 | 12.0 | 5.8 | 5.8 | 100.0 | 51.6 |
| Lone person, 65 and over | % | 67.1 | 18.8 | 6.7 | 4.0 | 3.5 | 100.0 | 32.7 |
| **Adjusted equivalised disposable household income, incl. imputed rent - quintiles** | | | | | | | | |
| Lone person under 35 | % | 17.8 | 17.0 | 19.5 | 26.6 | 19.1 | 100.0 | 10.8 |
| Couple only, reference person under 35 | % | 6.3 | 7.7 | 14.2 | 33.3 | 38.5 | 100.0 | 5.4 |
| Couple with dependent children only, eldest child under 5 | % | 13.3 | 20.2 | 24.2 | 26.5 | 15.8 | 100.0 | 17.7 |
| Couple with dependent children only, eldest child 5 to 14 | % | 19.6 | 22.3 | 22.5 | 19.2 | 16.3 | 100.0 | 18.9 |
| Couple with dependent children only, eldest child 15 to 24 | % | 17.6 | 13.6 | 25.3 | 21.8 | 21.6 | 100.0 | 13.2 |
| Lone parent with dependent and non-dependent children only | % | 42.4 | 27.4 | 15.9 | 9.1 | 5.3 | 100.0 | 37.2 |
| Couple with dependent and non-dependent children only | % | 15.5 | 10.8 | 21.6 | 28.3 | 23.7 | 100.0 | 12.5 |
| Couple with non-dependent children only | % | 8.6 | 12.1 | 21.9 | 24.2 | 33.1 | 100.0 | 10.7 |
| Couple only, reference person 55 to 64 | % | 14.5 | 17.8 | 15.1 | 21.7 | 30.9 | 100.0 | 16.4 |
| Couple only, reference person 65 and over | % | 28.1 | 37.0 | 17.2 | 10.2 | 7.5 | 100.0 | 41.1 |
| Lone person, 65 and over | % | 34.4 | 37.3 | 16.0 | 7.0 | 5.3 | 100.0 | 42.9 |

* estimate has a relative standard error of 25% to 50% and should be used with caution

The proportions of lone persons aged 65 years and over and couple only households with the reference person aged 65 years and over who were in the lowest income quintile both decreased significantly when net imputed rent was added to income. For lone persons aged 65 years and over, the proportion of households in the lowest income quintile decreased by about half (from 67% to 34%). For most other life cycle groups, the proportion who were ranked in the lowest income quintile increased following the addition of net imputed rent.

At the other end of the income distribution, the proportion of younger life cycle group households who were in the highest quintile decreased, i.e. lone persons under 35 years of age, couple only households under 35 years and couples with dependent children only, where the eldest child was less than 15. The proportion of most other life cycle groups in the highest income quintile increased.

Previous Page Next Page

# States and territories



**STATES AND TERRITORIES**

There are considerable differences in the average levels of household income between the states and territories. The effect of adding net imputed rent to income increases incomes, on average, by 6%, with the biggest increase in

the Australian Capital Territory at 7% and the smallest increase in Western Australia at 4%. However, much of the variation in income levels between states and territories is preserved after net imputed rent is added to income. That is, the relative income rankings remain the same and the ratio of the lowest to highest mean incomes for states and territories remains at 0.69.

Table 6.6 presents the mean incomes, with and without net imputed rent, for each of the states and territories as well as their capital cities and the balance of state.

**6.6 Mean equivalised houshold income, with and without imputed rent, by states and territories, 2005-06**

| | Mean equivalised disposable household income (per week) | | | Adjusted mean equivalised disposable household income, incl. imputed rent (per week) | | |
|---|---|---|---|---|---|---|
| | Capital city | Balance of state | All households | Capital city | Balance of state | All households |
| | $ | $ | $ | $ | $ | $ |
| NSW | 712 | 568 | 660 | 756 | 606 | 702 |
| Vic | 658 | 577 | 635 | 701 | 608 | 675 |
| Qld | 673 | 597 | 632 | 715 | 630 | 669 |
| SA | 617 | 568 | 605 | 651 | 594 | 636 |
| WA | 663 | 643 | 658 | 691 | 667 | 686 |
| Tas | 597 | 510 | 546 | 635 | 538 | 578 |
| NT(a) | 730 | np | 724 | 771 | np | 766 |
| ACT(b) | 786 | . . | 786 | 844 | . . | 844 |
| Aust. | 678 | 582 | 644 | 719 | 615 | 682 |

. . not applicable
np not available for publication but included in totals where applicable, unless otherwise indicated
(a) Households in collection districts defined as very remote were excluded, accounting for about 24% of the population in the NT. NT estimates for balance of state are not shown separately since estimates for the NT other than Darwin are not considered reliable.
(b) The balance of state is not available for the ACT. Estimates for the ACT are the same as those for Canberra.

Previous Page Next Page

# Conclusion

Contents >> Conclusion

**CONCLUSION**

In this paper, experimental estimates of imputed rent for owner-occupied dwellings, and of the benefits to tenants paying subsidised rent or occupying their dwelling rent-free, have been presented. The effect of the inclusion of imputed rent on the distribution of income among private households in Australia has also been examined.

The inclusion of net imputed rent in income measures provides a broader picture of the economic wellbeing of owner-occupier households and their circumstances relative to other households, and has a partial equalising effect on the income distribution. Reflecting their high rates of outright home ownership, the inclusion of net imputed rent results in the greatest increases in equivalised disposable household incomes for couples with reference person aged 65 and over and lone persons aged 65 and over, although these groups still have amongst the lowest incomes of the selected life cycle groups examined in this paper.

In 2005-06 the proportion of owners without a mortgage in the lowest equivalised disposable household income quintile decreased from 48% to 30% once imputed rent is added to income. The corollary was an increase in the proportions of renters and mortgagors in the lowest equivalised disposable household income quintile when net imputed rent was included.

When imputed rent was included in household income, the characteristics of those in the lowest income decile changed significantly. With 33% of people in the lowest equivalised disposable household income decile moving up the distribution, largely reflecting older people who owned their home outright, the mean age of the reference person in the lowest decile dropped from 58 to 49 years and mean net worth and mean expenditure both fell.

The methodologies used to produce the experimental estimates presented in this paper can be applied whenever a SIH or HES is conducted. Subject to feedback from users, the ABS is considering repeating the study using data from the 2009-10 SIH and HES.

The ABS would welcome any comments from users on the methodology applied in the study and the usefulness of the resulting estimates for analytical purposes. Comments can be forwarded to: Director, Living Conditions Section, Australian Bureau of Statistics, Locked Bag 10, BELCONNEN ACT 2616. Alternatively, email <living.conditions@abs.gov.au>.

Previous Page

# Explanatory Notes

## Glossary

### GLOSSARY

**Balance of state**

That part of each Australian state or territory not defined as capital city. Balance of state estimates for Northern Territory are regarded as too unreliable to publish separately since they exclude collection districts defined as very remote, which account for a significant proportion of the population. All of the Australian Capital Territory is defined as capital city for this publication.

**Capital city**

Refers to Australia's six state capital city Statistical Divisions and the Darwin Statistical Division as defined in the **Australian Standard Geographical Classification** (cat. no. 1216.0). For the Australian Capital Territory the estimates relate predominantly to urban areas.

**Collection district**

The Census Collection District (CD) is the smallest geographic area defined in the **Australian Standard Geographical Classification** (cat. no. 1216.0).

**Commonwealth-State Housing Agreement**

An agreement made between the Australian, state and territory governments under the Housing Assistance Act 1996 (Cwlth) to provide strategic direction and funding certainty for the provision of housing assistance.

**Consumer Price Index (CPI)**

A general measure of price inflation for the household sector in Australia. Specifically, it provides a measure of changes, over time, in the cost of a constant basket of goods and services acquired by capital city households in Australia.

**Couple**

Two persons in a registered or de facto marriage, who usually live in the same household.

**Deciles**

Groupings that result from ranking all households or people in the population in ascending order according to some characteristic, such as their household income, and then dividing the population into 10 equal groups, each comprising 10% of the estimated population.

**Dependent children**

All persons aged under 15 years; and people aged 15-24 years who are full-time students, have a parent in the household and do not have a partner or child of their own in the household.

**Disposable income**

Gross income less income tax and the Medicare levy i.e. remaining income after taxes are deducted, which is available to support consumption and/or saving. Income tax and the Medicare levy are imputed based on each person's income and other characteristics as reported in the survey. Disposable income is sometimes referred to as net income.

**Dwelling**

Defined as a suite of rooms contained within a building which are self-contained and intended for long-term residential use. To be self-contained the suite of rooms must possess cooking and bathing facilities as building fixtures. See also Dwelling structure.

**Employed**

Persons aged 15 years and over who, during the week before the interview:

- worked one hour or more for pay, profit, commission or payment in kind in a job or business, or on a farm (includes employees, employers and own account workers)
- worked one hour or more, without pay, in a family business or on a family farm
- had a job, business or farm but was not at work because of holidays, sickness or other reason.

**Employee**

An employed person who, for most of his/her working hours:

- works for a public or private employer and receives remuneration in wages or salary, or is paid a retainer fee by his/her employer and works on a commission basis, or works for an employer for tips, piece-rates or payment in kind, or
- operates his or her own incorporated enterprise with or without hiring employees.

**Employer**

A person who operates his or her own unincorporated economic enterprise or engages independently in a profession or trade, and hires one or more employees.

**Equity in the dwelling**

A household's equity in the dwelling is the difference between the value of the dwelling and the total amount outstanding on loans related to the dwelling. The loans included are any mortgages on the dwelling (excluding those for business or investment purposes), and any unsecured loans taken out for housing purposes.

**Equivalised disposable household income**

Disposable household income adjusted using an equivalence scale. For a lone person household it is equal to disposable household income. For a household comprising more than one person, it is an indicator of the disposable household income that would need to be received by a lone person household to enjoy the same level of economic wellbeing as the household in question. For further information see Appendix 3 in **Household Income and Income Distribution, Australia**, 2005-06 (cat. no. 6523.0).

**Family**

Two or more people, one of whom is at least 15 years of age, who are related by blood, marriage (registered or de facto), adoption, step or fostering, and who usually live in the same household. A separate family is formed for each married couple, or for each set of parent-child relationships where only one parent is present.

**Flat, unit or apartment**

Includes all self-contained dwellings in blocks of flats, units or apartments. These dwellings do not have their own private grounds and usually share a common entrance foyer or stairwell. This category includes houses converted into flats and flats attached to houses such as granny flats. A house with a granny flat attached is regarded as a separate house.

**Gross imputed rent**

The estimated market rent that a dwelling would attract if it were to be commercially rented.

**Gross income**

Regular cash receipts (including salary sacrificed income) before income tax or the Medicare levy are deducted.

**Household**

A person living alone or a group of related or unrelated people who usually live in the same private dwelling.

**Housing costs**

Housing costs for the purpose of calculating net imputed rent for owner-occupiers in this study comprise:

- rates payments (general and water)
- body corporate fees
- the interest component of mortgage and unsecured loan repayments, where the loan was obtained for the purposes of purchasing or building
- rent payments
- house insurance costs
- repair and maintenance costs.

**Income**

Regular and recurring cash receipts including monies received from:

- wages and salaries (whether from an employer or own incorporated enterprise), including income provided as part of a salary sacrifice arrangement
- profit/loss from own unincorporated business (including partnerships)
- investment income (interest, rent, dividends, royalties)
- government pensions and allowances
- private cash transfers (e.g. superannuation, regular workers' compensation, income from annuities, child support, and other transfers from other households).

Gross income is the sum of the income from all these sources before income tax or the Medicare levy are deducted. Note that child support and other transfers from other households are not deducted from the incomes of the households making the transfers. Other measures of income are disposable income and equivalised disposable income.

See also Gross income, Disposable income and Equivalised disposable household income.

**Incorporated business**

An incorporated business is a company that has a registered business name with the Australian Securities and Investment Commission (ASIC) and a legal status which is separate to that of the individual owners of the business.

**Landlord type**

For renters, the type of entity to whom rent is paid or with whom the tenure contract or arrangement is made.

**Lone person household**

A household consisting of a person living alone.

**Low income households**

For the purpose of this publication, low income households are defined as those containing the 20% of people with equivalised disposable household income between the 10th and 30th percentiles.

**Market rent**

The rent that a dwelling would attract if it was commercially rented.

**Market renter**

For the purpose of this study, a market renter is a household that rents its dwelling from a real-estate agent, an unrelated person not living in the same household, or the owner/manager of a caravan park.

**Medicare levy**

Medicare is Australia's universal health care system. The Medicare levy is a specific tax, based on individual income, intended to assist in the funding of this system.

**Mortgage**

A mortgage is a loan taken out using the usual residence as security. An owner with a mortgage must still owe money from such a loan.

**Net imputed rent**

Gross imputed rent less housing costs. Net imputed rent is an estimate of the value for the flow of household consumption services conferred by home ownership or by households paying subsidised rent or occupying their dwelling rent-free.

**Net worth**

Net worth represents the difference between the value of household assets (both financial and non-financial) and the value of household liabilities. Net worth is positive when the value of a household's assets exceeds the value of its liabilities. Net worth is negative when household liabilities exceed household assets.

**Non-dependent children**

All people aged 15 years and over who:

- do not have a spouse or offspring of their own in the household
- have a parent in the household, and
- are not full-time students aged 15-24 years.

**One parent family with dependent children**

One parent family with dependent children - a household comprising a lone parent with at least one dependent child. The household may also include non-dependent children, other relatives and unrelated individuals.

**Own unincorporated business income**

The profit/loss that accrues to persons as owners of, or partners in, unincorporated businesses. Profit/loss consists of the value of gross output of the business less operating expenses (including depreciation). Losses occur when operating expenses are greater than gross receipts and are treated as negative income.

**Owner (of dwelling)**

A household in which at least one member owns the dwelling in which the household members usually reside. Owners are divided into two classifications - owners without a mortgage and owners with a mortgage. If there is any outstanding mortgage or loan secured against the dwelling the household is an owner with a mortgage. If there is no mortgage or loan secured against the dwelling the household is an owner without a mortgage.

**Owner-occupied dwelling**

A dwelling usually inhabited by its owner.

**Private renter**

A household paying rent to a landlord who is a real estate agent, a parent or other relative not in the same household, or another person not in the same household.

**Public renter**

A household paying rent to a state or territory housing authority or trust.

**Quintiles**

Groupings that result from ranking all households or people in the population in ascending order according to some characteristic, such as their household income, and then dividing the population into five equal groups, each comprising 20% of the estimated population. In this publication the quintiles are formed by ranking people by their equivalised disposable household income.

**Reference person**

The reference person for each household is chosen by applying, to all household members aged 15 years and over, the selection criteria below, in the order listed, until a single appropriate reference person is identified:

- one of the partners in a registered or de facto marriage, with dependent children
- one of the partners in a registered or de facto marriage, without dependent children
- a lone parent with dependent children
- the person with the highest income
- the eldest person.

For example, in a household containing a lone parent with a non-dependent child, the one with the higher income will become the reference person. However, if both individuals have the same income, the elder will become the reference person.

**Renter**

A household which pays rent to reside in the dwelling. See Tenure type and Landlord type.

**Salary sacrifice**

An arrangement under which an employee agrees contractually to forgo part of their remuneration, which the employee would otherwise receive as wages and salaries, in return for the employer or someone associated with the employer providing benefits of a similar value.

**State/territory housing authority**

A state/territory government authority which, under the Housing Assistance Act 1996 (Cwlth) and in accordance with a Commonwealth-State Housing Agreement, is charged with the provision of housing assistance.

**Subsidised renter**

A household renting its dwelling for less than it would be expected to pay in a commercial market. For the purpose of this study, subsidised renters are those households renting from a parent or other relative not living in the same household, an employer, or a housing cooperative or community/church group. However, some households in these categories were judged to be paying commercial rents; net imputed rent for such households was zero.

**Tenure type**

The nature of a household's legal right to occupy the dwelling in which the household members usually reside. Tenure is determined according to whether the household owns the dwelling outright, owns the dwelling but has a mortgage or loan secured against it, is paying rent to live in the dwelling, occupies the dwelling rent free, or has some other arrangement to occupy the dwelling. For the purpose of this study, renters have been further disaggregated into market renters, tenants of state/territory housing authorities and other subsidised renters, based on their landlord type.

**Unincorporated business**

A business in which the owner(s) and the business are the same legal entity, so that, for example, the owner(s) are personally liable for any business debts that are incurred.

**Wages and salaries**

The gross cash income received as a return to labour from an employer or from a person's own incorporated business. Salary sacrificed income is regarded as cash or 'near cash' income and is included in the scope of wages and salaries.

**Wealth**

See Net worth.

# Abbreviations

## ABBREVIATIONS

The following symbols and abbreviations are used in this publication:

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| ACT | Australian Capital Territory |
| ASNA | Australian System of National Accounts |
| Aust. | Australia |
| CPI | consumer price index |
| CRB | collector record book |
| CSHA | Commonwealth–State Housing Agreement |
| CURF | confidentialised unit record file |
| EDHI | equivalised disposable household income |
| FIS | fiscal incidence study |
| HES | Household Expenditure Survey |
| incl. | including |
| ICLS | International Conference of Labour Statisticians |
| ILO | International Labour Organization |
| no. | number |
| NSW | New South Wales |
| NT | Northern Territory |
| Qld | Queensland |
| RSE | relative standard error |
| SA | South Australia |
| SE | standard error |
| SHA | State or Territory housing authority |
| SIH | Survey of Income and Housing |
| Tas. | Tasmania |
| Vic. | Victoria |
| WA | Western Australia |

# Detailed methodology (Appendix 1)

## **APPENDIX 1** DETAILED METHODOLOGY

### INTRODUCTION

This appendix provides greater technical detail of the methodology broadly summarised in Section 3 of the Information Paper.

The United Nations System of National Accounts 1993 recommends the market value approach as the method for imputing rent for owner-occupied dwellings. In the Australian System of National Accounts, the market value approach is used to produce estimates of the gross imputed rent for owner-occupied dwellings in the national household income account.

While the international standards for household income and expenditure statistics (ILO 2003) also recommend the same approach, there is no recommendation in relation to the specific imputation methods to be applied. In practice, a range of methods could be applied to household survey data to determine the equivalent gross market rental value of an owner-occupied dwelling. These include using a self-reporting method, applying a fixed rate of rental return, and/or statistical modelling.

The Statistical Office of the European Communities, Eurostat, has recommended a methodology that uses hedonic modelling of renters in the calculation of imputed rentals for dwelling services of owner-occupiers. Readers interested in the details of the Eurostat methodology may refer to Eurostat (2006).

In light of the availability of relevant ABS household survey data on the housing characteristics of households and the rent paid by tenants, this ABS study adopted the market value approach and used statistical modelling similar to that recommended by Eurostat to estimate the net imputed rent for owner-occupied dwellings. The Heckman

method was also utilised in the modelling to account for the sample selection bias resulting from using modelled market rents from renters in the imputation process (see Heckman 1979).

Net imputed rent is calculated by subtracting housing costs from the estimated gross rents. Some components of housing costs were modelled using a stratification method.

## BUILDING A MODEL FOR GROSS IMPUTED RENT BASED ON RENTERS

An imputation of the modelled market rents from the renter to the owner-occupier population is required as the market rent concept is only relevant to the renter population.

In the study outlined in this paper, hedonic regression was employed to explain the market rent for renters as a function of location and dwelling characteristics using SIH data. It decomposes the market rent for renters into its constituent characteristics (e.g. dwelling structure, location attributes or other characteristics), and estimates the value of each characteristic. These estimates were used in the calculation of the gross rent for the owner-occupier population. Readers interested in hedonics concepts and theories may refer to Rosen (1974).

### Model specification

#### *The dependent variable*

For this study, a semi-log functional form was employed. This is common in many hedonic modelling studies in Australia and is sufficient in addressing the problems of multicollinearity and heteroscedasticity.

#### *The explanatory variables*

Ideally, all major characteristics which influence market rents should be represented in the models, but often data are not available. The variables available for this study were limited to location and dwelling characteristics plus some household characteristics that can be directly observed or derived from the SIH and Census results. These observed characteristics are considered important in market-determined rents paid by tenants in the private rental market.

In this study, the explanatory variables were divided into two types.

Type I variables

Type I variables describe the characteristics of the dwelling. The variables used were:

- State - The state/territory where the dwelling is located
- Section of state - The section of state as defined in SIH, that is, major urban, other urban, bounded locality and rural balance
- Type of dwelling - Whether the dwelling was: a separate house; a semi-detached, row or terrace house, townhouse etc. with one storey; a semi-detached, row or terrace house, townhouse etc. with two or more storeys; a flat, unit or apartment in a 1 or 2 storey block; or a flat, unit or apartment in a 3 or more storey block
- Dwelling size - In the absence of a measure of the total floor area of the dwelling, the total number of bedrooms was used as indicator of the dwelling size
- Socio-Economic Index for Areas (SEIFA) 2001 - the Index of Relative Socio-Economic Advantage/ Disadvantage was used to indicate the socio-economic condition of the area where the dwelling is located. A higher score indicates that an area has attributes such as a relatively high proportion of people with high incomes or a skilled workforce. For more information on the SEIFA, see ABS (2003). In this study, SEIFA quintiles were derived using the SEIFA Index scores for the corresponding Census 2001 Collection districts (CD). The corresponding SEIFA quintile for the dwelling was used as a dummy variable in the modelling. For the small proportion of CDs where SEIFA was not available, the SEIFA quintile was imputed using the most frequently occurring CD SEIFA quintile in the postal area where the CD was located
- Rent by area deciles - Rent by area decile dummy variables were created using Census information for postcode areas to supplement the very broad locational attributes of 'State' and 'Section of state' used in the modelling. It can be considered as a proxy for a range of unaccounted characteristics associated with dwelling location, providing a finer geographic indicator of the variation of market rent throughout Australia. For 2003-04, the modelling used the 2001 Census results while the 2005-06 modelling utilised the more recent 2006 Census results. Each postcode in Australia was ranked by their median rent and then summarised as

deciles, allowing small geographic areas to be assembled into homogeneous groups by their median rent. Each of the dwellings in the renter population was assigned the corresponding postcode decile.

Type II variables

Type II variables describe the characteristics of the households renting the dwellings. These variables are only included in the modelling of the market rent for renters to reduce the chance of model misspecification. The purpose of the modelling was to predict a rent that a property commands and not what the occupants can afford or the nature of their tenancy. The variables included:

- Household income - Deciles of gross household income were used for this variable.
- Landlord type - Information on whether the dwelling was rented through a real estate agent or from an unrelated person not living in the same household.

***The Mills ratio***

The Heckman procedure adjusted the hedonic model for any potential selection bias that could result from non-random selection from the renter population. It produced a statistical measure known as the Inverse Mills ratio which tests for the presence of selection bias. The Heckman procedure utilised logistic modelling in the calculation of the Inverse Mills ratio. More details about the Heckman procedure can be found in Heckman (1979) and Eurostat (2006).

***The hedonic model***

The basic model for the market renters was formulated as:

$$\ln R_i = \alpha_0 + \sum_{j=1}^{J} \beta_j X_{ji} + \sum_{k=1}^{K} \delta_k Z_{ki} + \phi M_i + \varepsilon_i \quad (1)$$

where

$\ln R_i$ is the natural logarithm of the weekly rent (i=1,2,3, ... , n, where n is the total number of renters),

$X_{ji}$ is the jth type I variable,

$Z_{ki}$ is the kth type II variable,

$M_i$ is the estimated Inverse Mills ratio,

$\varepsilon_i$ is the error term,

$\alpha_0$ is the model intercept, and

$\beta_j$, $\delta_k$ and $\phi$ are the parameters which were estimated and used in the imputation of gross imputed rent for owner-occupiers.

**Estimation and diagnostics**

An Ordinary Least Squares (OLS) procedure was used to estimate the parameters of the above model. The goodness-of-fit of the estimated model was examined by looking at the estimated adjusted R-squared, which was found to be reasonably good for this cross-sectional analysis (i.e. 54 % for 2003-04 and 60 % for 2005-06).

The analysis of variance table was also examined for the overall significance of the model. Each of the estimated coefficients had the expected sign and statistical significance was checked. For both periods, the residuals plot displayed a random distribution of errors and the residuals were normally distributed. Presence of heteroscedastic variance and multicollinearity were also checked.

**Explanatory notes**

As mentioned previously, the effectiveness of hedonic modelling is critically dependent on the availability of data on rent-determining characteristics in the private rental market. Information available from SIH on the location and dwelling characteristics is limited.

Data were not available to further define location in terms of important attributes such as views or beach frontage and proximity to employment, transport and shops/services. Data were also not available on the market value of the rented dwelling (as a strong relationship between the house value and rent paid would be expected) nor on some important structural characteristics of the dwellings such as outer-wall construction, availability of garaged or off-street parking, size of block or number of bathrooms.

It was also not possible to account for any quality differences that might exist between owner-occupied and rented dwellings with similar characteristics. For example, owner-occupied dwellings may generally be fit-out with higher quality fittings or building materials, or maintained to a higher standard, although there were no data available to enable any differences to be quantified. This limitation applies to all estimates of imputed rent that were reviewed as part of this ABS project, whether compiled at the sectoral or household levels.

In addition to the locational and dwelling characteristics used in the hedonic model, logistic modelling to obtain the Inverse Mills ratio used the characteristics of the occupants including age of reference person, family composition and highest level of educational attainment of the reference person.

For both 2003-04 and 2005-06, the estimated coefficients for the Mills ratio were found not to be statistically significant. The Mills ratio variable was therefore dropped during the final estimation of the basic model. This indicates that there was no problem of selection bias in the renters data.

**ESTIMATING GROSS IMPUTED RENT FOR OWNER-OCCUPIERS**

The experimental estimates of the rental equivalence or gross imputed rent for owner-occupied and other dwellings were calculated using the estimated parameter coefficients ($\hat{\alpha}_0$, $\hat{\beta}_j$, $\hat{\delta}_k$) from the basic renter model. Using the basic model specification above, excluding the Mills ratio, the rent was imputed for owner-occupied dwellings via regression model prediction.

**Intercept adjustment**

Firstly, the intercept was adjusted to control for the effect of type II variables used in the previous regression, as they do not have strong relevance to owner-occupied dwellings.

To do this, the intercept was adjusted to the mean for renters, that is:

$$\hat{\alpha}_0^{adj} = \hat{\alpha}_0 + \sum_{k=1}^{K} \hat{\delta}_k \bar{Z}_k \quad (2)$$

where

$\hat{\alpha}_0^{adj}$ is the adjusted intercept for imputation,

$\hat{\alpha}_0$ is the intercept estimate of the basic model,

$\hat{\delta}_k$ is the estimated coefficient for the kth type II variable, and

$\bar{Z}_k$ is the mean of the kth type II variable.

**Log adjustment**

An adjustment was also required when taking the exponential of the log of rent to recover weekly rent values. An adjustment factor based on the estimated variance of the residual from the regression ensures the weekly rent values are centred around the mean (Eurostat 2006, p.25). Thus, the imputation equation with the log adjustment was formulated as:

$$\hat{R}_i^{OOD} = \exp\left(\hat{\alpha}_0^{adj} + \sum_{j=1}^{J} \hat{\beta}_j X_{ji}^{OOD}\right) * \exp\left(\frac{\hat{\sigma}^2}{2}\right) \quad (3)$$

where

$\hat{R}_i^{OOD}$ is the estimated gross imputed rent for owner-occupied dwelling (i=1,2,3,...,n, where n is the total number of owner-occupiers),

$\hat{\alpha}_0^{adj}$ is the adjusted intercept calculated in equation (2),

$\hat{\beta}_j$ is the coefficient estimate for the jth type I variable in model (1),

$X_{ji}^{OOD}$ is the owner's jth type I variable, and

$\hat{\sigma}^2$ is the estimated variance of the error term.

Note that it was assumed that $\varepsilon$ followed a normal distribution with mean 0 and variance $\sigma^2$.

**Scaling factor**

A final scaling factor was applied to preserve the relationship between the observed and modelled rent estimates for private market renters. The imputed rent distribution was repositioned to the original median rent observed from private market renters data.

The scaling factor was calculated as the difference between the weekly rent (R) and the estimated median gross imputed rent for private market renters (including the log adjustment). The median was used due to the skewness of the original market rent distribution. The scaling factor was found to be -$9.18 in 2003-04 and -$6.11 in 2005-06. A multiplicative scaling factor, i.e. the observed median rent as a ratio of the median imputed gross rent, was also considered, but its application resulted in unfavourable compression of the distribution and it was not applied.

The equation for the scaling factor is given by:

Scaling factor = median($R$) - median($\hat{R}^{renter}$) (4)

and the final imputation of gross imputed rent for owner-occupied dwellings is adjusted as:

$\hat{R}_i^{OOD^{adjusted}}$ = $\hat{R}_i^{OOD}$ + (Scaling factor) (5)

**Extrapolating imputed rent for high value owner-occupied dwellings**

Data on the house value for owner-occupied dwellings is available from the SIH. Further investigation of the relationship between the estimated gross imputed rent and house value for owner-occupied dwellings revealed that for higher dwelling values the observed location and dwelling characteristics did not fully explain the variation in rent.

An extrapolation method using the relationship between gross rents and house value for the majority of owner-occupied dwellings, to adjust gross imputed rents for high value dwellings, was additionally worked into the study.

***Setting the cut-offs for extrapolation***

A visual inspection of the modelled results against the value of the dwelling suggested that $400 per week rent was the highest value of gross imputed rent that could be reasonably determined from the model, referred to in this paper as the 'ceiling rent'.

The dwelling value cut-off point for extrapolation was then determined by dividing the annual 'ceiling rent' by the model-estimated annual average rate of rental return for all owner-occupied dwellings, that is 3% in 2003-04 and 2.9% in 2005-06. The corresponding dwelling value cut-offs for extrapolation were $695,200 and $719,172. The proportion of owner-occupied dwellings that underwent extrapolation was 6.5% in 2003-04 and 7.5% in 2005-06.

***Extrapolation via Regression Modelling***

It was established from the owner-occupier data that the estimated rental rate of return has an inverse relationship with house value. Hence a quadratic inverse model for the rental rate of return was fitted and estimated using all observations below the respective cut-offs. The model is given by:

$$r_i = \theta_0 + \theta_1 \frac{1}{p_i} + \theta_2 \left(\frac{1}{p_i}\right)^2 + v_i \quad (6)$$

where

$r_i$ is the rental rate of return for ith owner calculated as $\tilde{R}_i^{\text{imputed}} / p_i$,

$p_i$ is the ith house value,

$\theta$'s are the parameter coefficients for the inverse of price variables, and

$v_i$ is the error term of the model.

The gross imputed rents for those owner-occupiers with house values above the cut-off points were re-calculated using the estimated statistically significant coefficients in the above equation. The extrapolated gross imputed rent is given by:

$$\bar{R}_j^{\text{adjusted}} = p_j \times \hat{r}_j \quad (7)$$

where

$\bar{R}_j^{\text{adjusted}}$ is the adjusted gross imputed rent for the jth high value owner-occupied dwelling,

$p_j$ is the jth house value, and

$\hat{r}_j$ is the estimated rental rate of return.

Note that for 2005-06, the estimate for the third term in equation 6, $\hat{\theta}_2$, was found not to be statistically significant. It was therefore excluded in the extrapolation for that period.

**ESTIMATING HOUSING COSTS FOR OWNER-OCCUPIERS**

The SIH collects information on all relevant housing cost items except house insurance, and repairs and maintenance. Expenditure information on these data items is only available for the HES subsample in 2003-04. A stratification method was used to estimate weekly expenditures on these items for the entire SIH sample, and to enable extrapolation in 2005-06, when these information were not collected.

**Housing costs directly taken from SIH**

Expenditures on body corporate payments, general and water rates, and the interest component of repayments of loans for the purposes of purchasing or building, were directly collected in SIH. All housing costs were net of refunds.

**Estimating repair and maintenance costs**

Repair and maintenance costs refer to the costs of maintaining the dwelling as it was first built. They include payments to contractors and the cost of materials for repainting, electrical work, plumbing, re-roofing, etc. These expenditure items are collected in the HES with a recall period of three months for payments to contractors and two weeks for expenditure on materials.

Given that expenditure on these items is likely to be at infrequent intervals and of significantly varying amounts, the raw data at the individual household level was too volatile to be used directly. The 2003-04 HES subsample of owner-occupiers was stratified by number of bedrooms, enabling the average cost of repairs and maintenance within each stratum to be obtained. The average cost in the stratum to which a dwelling belongs was then imputed to all owner-occupiers in SIH.

Since 2005-06 was a non-HES year, repair and maintenance expenditure was estimated by extrapolating the 2003-04 repairs and maintenance data using the published ABS consumer price index on 'House repairs and maintenance'.

**Estimating insurance costs**

Stratification by number of bedrooms was also applied to enable calculation of the average cost of house insurance and imputation of the average house insurance costs to all owner-occupiers in 2003-04. The ratio between expenditure on house building insurance and home contents insurance was applied to those households where these amounts were unable to be collected separately. For 2005-06, expenditure was estimated by extrapolating the 2003-04 data using the published consumer price index for 'Insurance services'.

**ADJUSTING THE ESTIMATED NET IMPUTED RENT FOR TENANTS OF STATE/TERRITORY HOUSING AUTHORITIES**

The net imputed rent for public tenants was benchmarked to the state mean weekly rental subsidies published in the CSHA National Data Reports for 2003-04 and 2005-06 using a multiplicative adjustment. This factor was equal to the ratio of the CSHA state mean weekly rental subsidy over the state mean weekly net imputed rent for public tenants. That is

$$\bar{N}_{ij}^{SHA\ benchmarked} = \frac{\mu_j}{\bar{N}_j^{SHA}} \bar{N}_{ij}^{SHA} \quad (8)$$

where

$\bar{N}_{ij}^{SHA\ benchmarked}$ is the benchmarked net imputed rent for the ith state housing authority (SHA) renter in the jth state,

$\bar{N}_{ij}^{SHA}$ is the modelled net imputed rent for the ith SHA renter in the jth state,

$\mu_j$ is the mean weekly rental subsidy for SHA tenants in the jth state, and

$\overline{N_j^{SHA}}$ is the mean net imputed rent for SHA tenants in the jth state.

#### REFERENCES


ABS (Australian Bureau of Statistics) 2003, **Information Paper: Census of Population and Housing: Socio-Economic Indexes for Areas, Australia, 2001**, cat. no. 2039.0, ABS, Canberra.

AIHW (Australian Institute of Health and Welfare) 2005, **Commonwealth-State Housing Agreement National Data Reports 2003-04, Public Rental Housing**, Housing Assistance Data Development Series, AIHW cat. no. HOU114.

AIHW 2006, **Public Rental Housing 2005-06: Commonwealth-State Housing Agreement National Data Reports**, Housing Assistance Data Development Series, AIHW cat. no. HOU153.

Eurostat 2006, 'HBS and EU-SILC Imputed Rent', Meeting of the Working Group on Living Conditions, Luxembourg, 15-16 May 2006.

Heckman, J. 1979, 'Sample Selection Bias as a Specification Error', **Econometrica**, vol. 47, no. 1, pp. 153-161.

International Conference of Labour Statisticians 2003, **Final Report of the 17th International Conference of Labour Statisticians, Geneva, 24 November to 3 December 2003**.

Rosen, H. 1974, 'Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition', **Journal of Political Economy**, Vol. 82, pp.34-55.


## Comparison of gross imputed rent for owner-occupiers between SIH and ASNA (Appendix 2)

### **APPENDIX 2** COMPARISON OF GROSS IMPUTED RENT FOR OWNER-OCCUPIERS BETWEEN SIH AND ASNA

#### INTRODUCTION

This publication contains experimental household level estimates of the gross imputed rent for owner-occupied dwellings in Australia, derived from data reported in the 2003-04 and 2005-06 Surveys of Income and Housing (SIH). This is the first time the ABS has produced household level estimates of the gross imputed rent for owner-occupied dwellings, although household sector estimates have been included in the Australian System of National Accounts (ASNA) for many years.

The SIH and ASNA estimates of gross imputed rent for owner-occupiers have been developed for different purposes, but apply similar concepts and methods. The SIH experimental estimates are derived from data collected from individual households, and may be used to aid analysis of the distribution of household income and to make more useful comparisons across population subgroups. The ASNA estimates are produced at an aggregate level for the household sector and are presented within a national accounting framework, allowing comparisons with the corporate and government sectors in Australia and to the rest of the world.

This appendix describes the major scope and methodological differences between the estimates produced from SIH and ASNA, and compares the aggregate results for the two reference periods.

#### CONCEPTS AND METHODS

The concepts and methods underpinning the estimation of gross imputed rent for owner-occupied dwellings in SIH

and ASNA have much in common, with both sources imputing a market value for the housing services accruing to owner-occupiers from the occupation of their primary residence (in ASNA a value is also imputed for any additional residences such as holiday homes). Both estimate the market value of the housing services accruing from the rental equivalent.

In producing the SIH imputations, the market value of the rental equivalent has been estimated by regressing actual rents paid by private renters on the characteristics of their unfurnished rented dwellings e.g. location, dwelling structure and number of bedrooms. The estimated coefficients have then been applied to the characteristics of owned dwellings to produce predicted values of the rental equivalence of these dwellings.

In producing the ASNA imputations, a benchmark is established using the Census of Population and Housing, which gives the number of owner-occupied and rented dwellings, and information about rents paid for rented dwellings. The imputed rent for owner-occupied dwellings is calculated by multiplying average private rents for unfurnished dwellings reported in the Census in various strata (defined by major urban, other urban, rural; cross classified by dwelling structure and number of bedrooms) by the number of owner-occupied dwellings in the same categories. For intercensal and post-census periods, the estimates are interpolated / extrapolated using a range of indicator data. Details are available in Section 04.2 of Australian National Accounts: Concepts, Sources and Methods (cat. no. 5216.0).

**DIFFERENCES IN SCOPE**

There are two scope differences which impact on the comparability of the SIH and ASNA estimates of gross imputed rent for owner-occupiers.

Firstly, the ASNA estimates include the gross imputed rent accruing to owner-occupiers not only from occupation of their primary residence, but also from any additional residences such as holiday homes. The ASNA estimates also include a portion of unoccupied dwellings. The SIH estimates capture only the imputed rent accruing to owner-occupiers from occupation of their primary residence. However, this scope difference can be quantified and is very small.

Secondly, SIH excludes households in collection districts defined as very remote. For most states and territories the exclusion of people in very remote areas has only a minor impact on the aggregate estimates because they constitute a small proportion of the population. The SIH estimates for the Northern Territory will be understated as very remote households account for about 24% of its population, but the scale of this exclusion is not clear. Because the majority of the population living in very remote households in the Northern Territory are living in discrete Indigenous communities where home ownership rates are very low, imputed rent estimates for home owners are not likely to be significantly underestimated for the Northern Territory. The estimates in this paper also exclude rental subsidies that may apply in the discrete Indigenous communities.

**DATA USED IN COMPARISON**

SIH is conducted throughout the financial year and respondents who rent their dwellings are asked to report the amount of rent they pay at the time they are surveyed. Therefore, the rent paid by private renters and the gross imputed rent for owner-occupiers are assumed to be average values for the year.

Elsewhere in this publication, the SIH estimates of gross imputed rent for owner-occupied dwellings are expressed in terms of a mean weekly value per household. To facilitate comparison with the ASNA estimates in this appendix, they are presented as Australian level annual aggregates. Multiplying the mean annual value per household for all households by the estimated number of in scope Australian households (7,735,800 for 2003-04 and 7,926,200 for 2005-06) provides the aggregate annual Australian values.

The ASNA estimates of gross imputed rent for owner-occupiers used in this appendix are those shown in table 60 of Australian System of National Accounts, 2006-07 (cat. no. 5204.0). Separate estimates of the imputed rent of owner-occupiers are only produced annually and are obtained by assuming a constant rate of change in the proportion of dwellings that are owner-occupied between Census benchmarks. For the post-census period, the rate of change observed for the previous intercensal period is used.

## COMPARISON OF ESTIMATES

Table A2.1 shows that, in both 2003-04 and 2005-06, the experimental SIH estimates of gross imputed rent at the Australian level were within 2% of the ASNA estimates. In 2003-04 they were 1.6% lower, but in 2005-06 they were 0.7% higher. Between the two reference periods, the SIH estimates grew by 15.8%, while the ASNA estimates grew by 13.2%.

**A2.1 Comparison of SIH experimental estimates with ASNA estimates of gross imputed rent for owner-occupiers**

| | 2003-04 | 2005-06 | Difference |
|---|---|---|---|
| ASNA estimate | $60 511m | $68 519m | 15.8% |
| SIH experimental estimate | $59 561m | $68 971m | 13.2% |
| Difference | -1.6% | 0.7% | . . |

. . not applicable

The proximity of the two estimates can largely be attributed to the broadly similar methodologies applied and to the generally accurate reporting of private rents in both data sources used.

However neither set of estimates takes into account any quality differences in the stock of rented and owned dwellings and therefore both estimates possibly underestimate the 'true value' of gross imputed rent for owner-occupiers. If this problem were to be overcome in the SIH estimates, dwelling values would have to be captured for rental properties. Survey respondents occupying rental properties are unlikely to be able to provide a reliable estimate of the value of the dwelling.

The two sets of estimates are compiled for quite different purposes. The ASNA estimates are compiled at the aggregate household sector level. For compilation of the ASNA regular annual and quarterly estimates are required. The SIH estimates are compiled at the unit record level to aid detailed analysis of the economic circumstances and income distribution of Australian households. Estimates are potentially required whenever a SIH is conducted and are of primary use as supplementary items on the SIH Confidentialised Unit Record File (CURF).

Both the household level and the sector level estimates are subject to various types of error. SIH data are subject to sampling and non-sampling error. Sources of non-sampling error include non-response, errors in reporting by respondents or recording of answers by interviewers, and errors in processing the data. Sampling error arises from sampling variability, and from the weighting and benchmarking processes which are designed to adjust the results from a sample survey to infer results for the total in scope population.

The ASNA estimates are benchmarked to the Census of Population and Housing and are interpolated and extrapolated over time using a range of indicator data. The strength of the ASNA methodology is the comprehensive Census benchmark, which is subject to non-sampling error, but not sampling error. The main weaknesses of the method are due to limitations with the indicators used to extrapolate the estimates for future periods and the long time period between the availability of data for successive Censuses (five years) when new benchmarks are established.